

Module 1 - Introduction

ME3023 - Measurements in Mechanical Systems

Mechanical Engineering

Tennessee Technological University

Topic 1 - General Measurement System

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- Welcome Back!
- Definition of a Measurement
- Measurement System Stages
- Examples in Mechanical Engineering

Welcome Back!

- Things are going to be different but we will still learn!
- These new outlines should help keep me/us on track.
- The material will be organized in ~ 10 min videos, and you can watch them at anytime.

Definition of a Measurement

“A **measurement** is an act of assigning a specific value to a physical variable.”

Text: Theory and Design of Mech. Meas.

Measurement System Stages

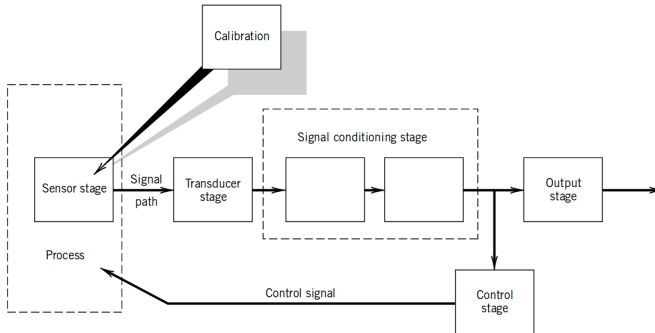
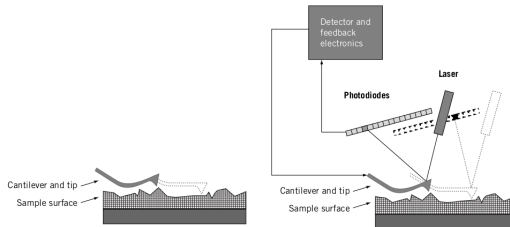


Figure 1.5 Components of a general measurement system.

Image: Theory and Design of Mech. Meas.

Sensor-Transducer Stage

a **sensor**, a physical element that employs some natural phenomenon... ..to sense the variable being measured

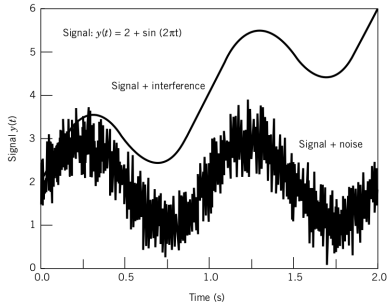


A **transducer** converts the sensed information into a detectable signal

Text, Image: Theory and Design of Mech. Meas.

Signal Conditioning Stage

What is the the definition of **signal**?



- Filtering
- Amplification
- Attenuation
- Excitation
- Linearization
- Electrical Isolation
- Surge Protection

Image: Theory and Design of Mech. Meas.

Output Stage

The **output stage** indicates or records the value measured. This might be a simple readout display, a marked scale, or even a recording device such as a computer disk drive.

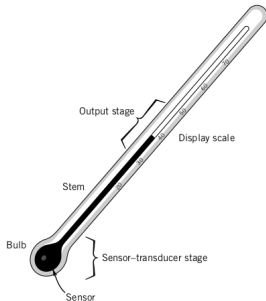


Image: Theory and Design of Mech. Meas.



Image: Wikipedia

Examples in Mechanical Engineering

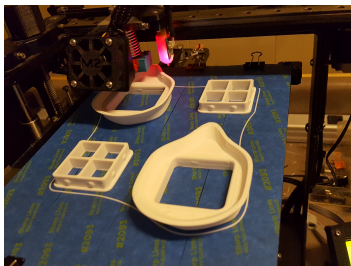
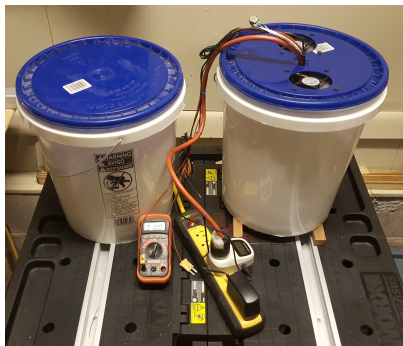


Image: T.Hill

3D printers (FDM) use PLA, ABS, PETG and other plastics which absorb moisture from the air over time causing adverse affects on part quality. This is particularly a problem in humid climates such the southeastern USA.

Engineering Example



Fortunately the *water-logged* plastic can be dehydrated for further use.

Inspect the DIY filament dryer shown and Identify each of the following measurement stages.

- Sensor - Transducer
- Signal Conditioning
- Output Stage
- Feedback Control ?